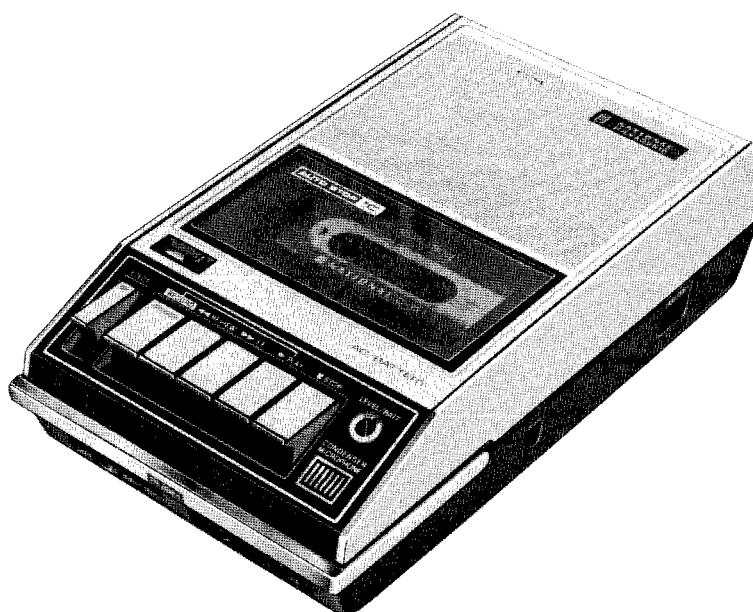


Service Manual

NATIONAL
TAPE RECORDER
PANASONIC

PORTABLE CASSETTE TAPE RECORDER



RQ-237S MECHANISM SERIES

RQ-421S

SPECIFICATIONS

Power Source:	AC: 90~109, 110~125, 200~219, 220~250 volts; 50/60 Hz DC: 6 volts (Four "C" type batteries) car/boat battery (using optional car/boat adaptor)	Erasing System:	AC erase
Power Consumption:	5 W	Tape Speed:	1-7/8 ips.
Motor:	DC mechanical governor motor	Fast Forward Time:	Approx. 90 seconds with C-60 cassette tape
Transistors:	2SB324(1)	Rewind Time:	Approx. 90 seconds with C-60 cassette tape
IC:	M5115P(1)	Frequency Response:	50~10,000 Hz
Diodes:	OA90Z(2) 1S1211(2) 2SR1K(1)	Inputs:	"MIC" -71 dB 600Ω "AUX" -20 dB 150 kΩ
Maximum Output:	1.5 W (RMS)	Recording Time:	One hour with C-60 cassette tape
Track System:	2-track monaural	Speakers:	4" dynamic speaker
Recording System:	AC bias 35 kHz	Dimensions:	6-1/4 (W) × 2-7/8" (H) × 10-7/32" (D)
		Weights:	4-1/2 lbs.

These specifications are subject to change in order to accommodate improvements in design.

MATSUSHITA ELECTRIC
MATSUSHITA ELECTRIC TRADING CO., LTD.

P. O. Box 288 Central, Osaka, Japan



LOCATION OF PARTS

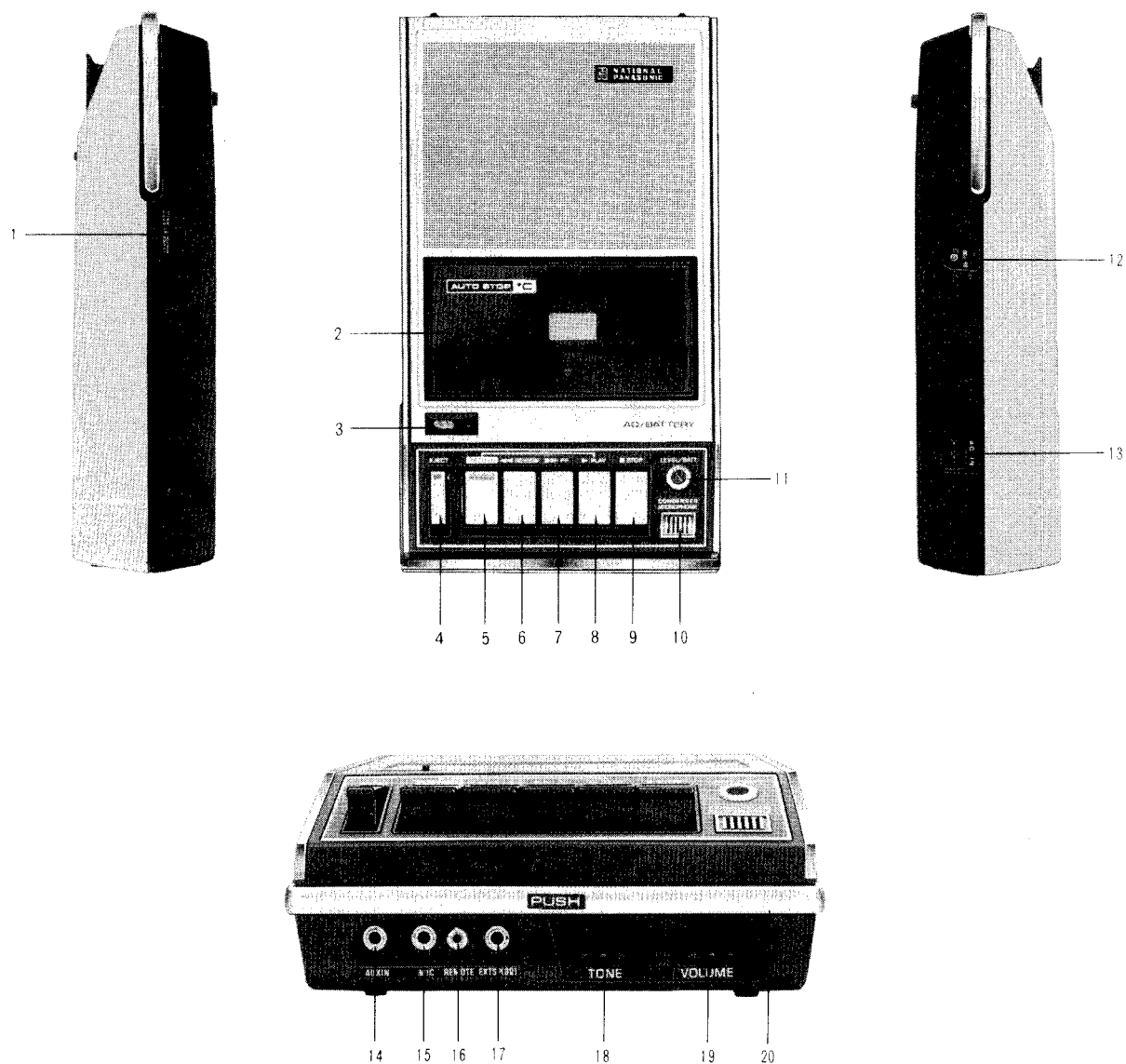


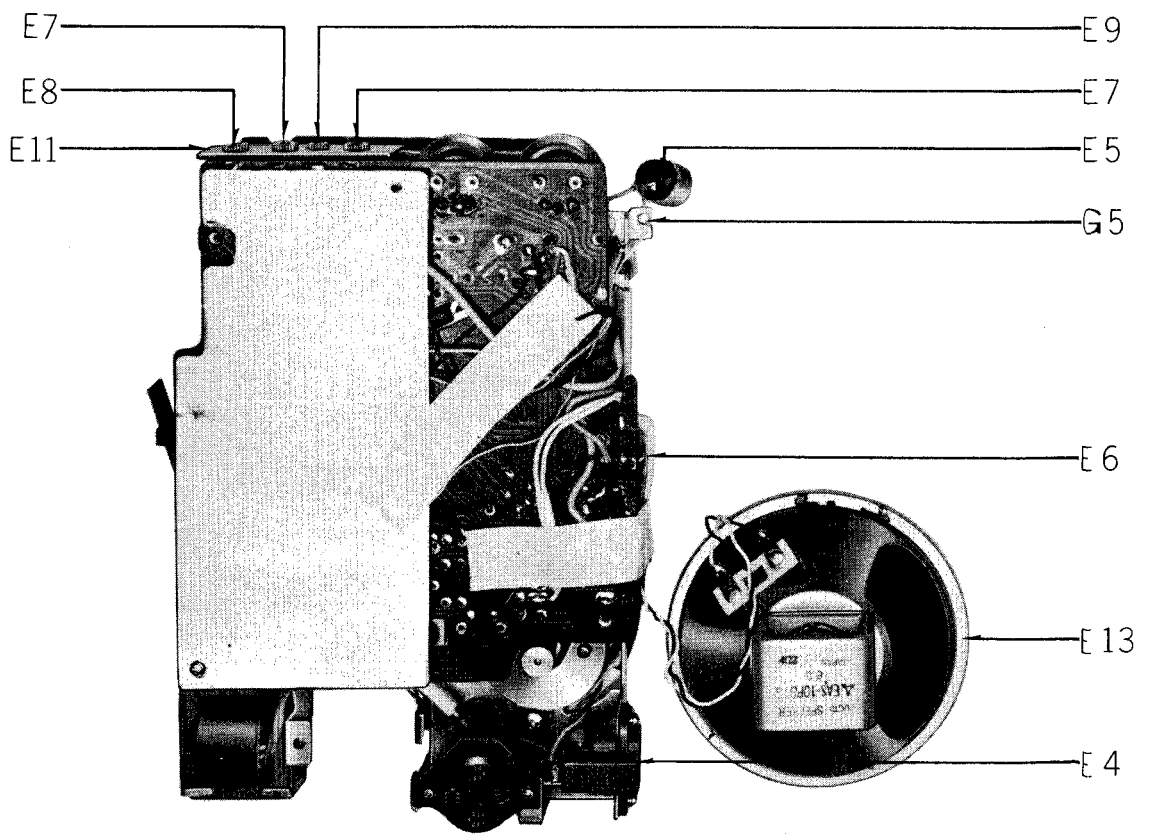
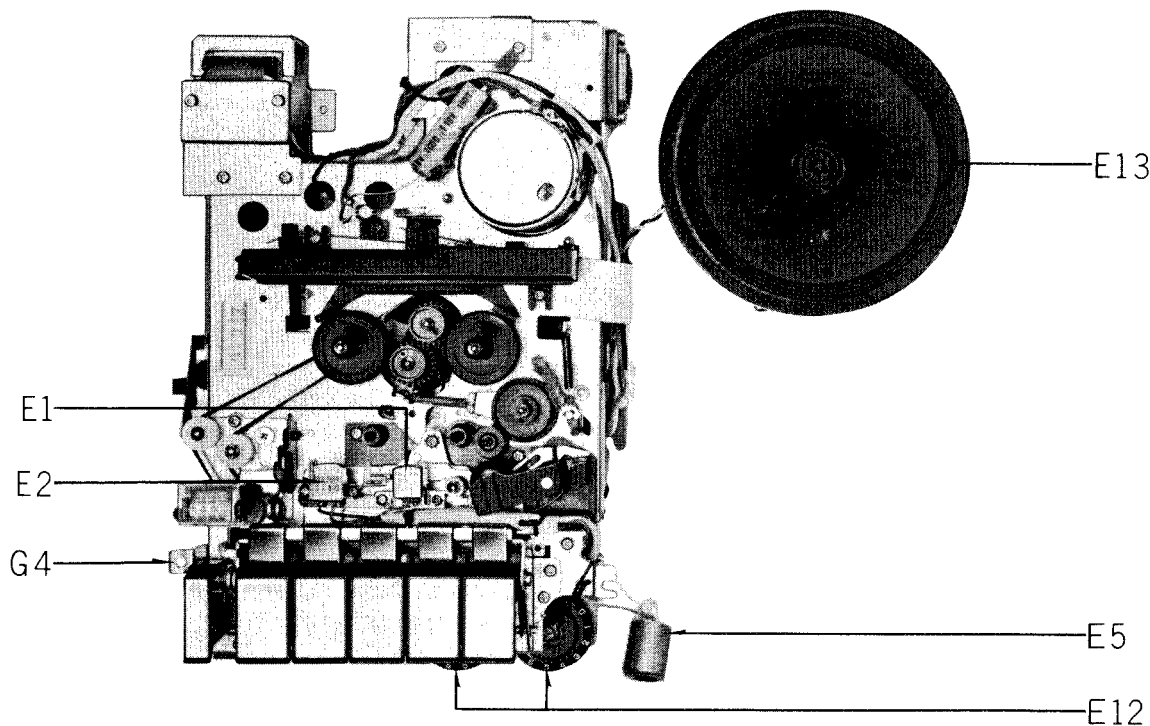
Fig. 1

- | | |
|------------------------------|----------------------------|
| ① Monitor switch | ⑪ Level meter |
| ② Cassette compartment cover | ⑫ DC IN |
| ③ Tape counter | ⑬ AC socket |
| ④ Ejection button | ⑭ Auxiliary input jack |
| ⑤ Record button | ⑮ External microphone jack |
| ⑥ Rewind button | ⑯ Remote jack |
| ⑦ Fast forward button | ⑰ External speaker jack |
| ⑧ Play button | ⑱ Tone control |
| ⑨ Stop button | ⑲ Volume control |
| ⑩ Built-in microphone | ⑳ Handle |

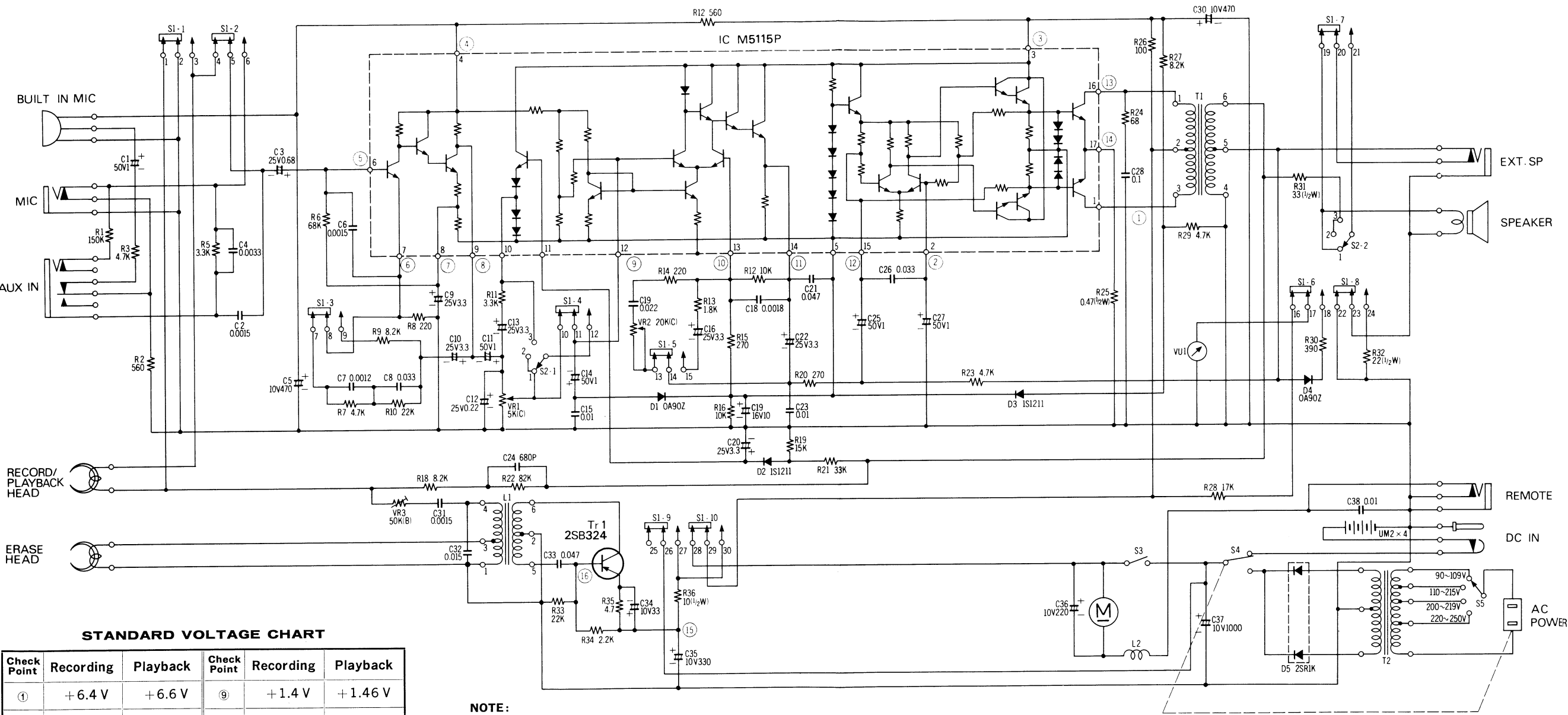
STANDARD VALUE TO TEST

ITEM	VALUE	PARTS TO BE ADJUSTED	REMARKS
Recording bias current.	0.45 ± 0.1 mA	VR3	Set the volume control to minimum.
Input level.	MIC -71 ± 4 dB AUX -20 ± 4 dB	—	To obtain $50 \pm 10 \mu\text{A}$ of recording current through the recording head. Set the volume control to maximum.
Bias Oscillation frequency.	35 kHz	—	—
Erase current.	9 V	—	Measure the value at both ends of erase head by VTVM.
Takeup tension.	50 ± 10 gr-cm	—	—
Pressure of pressure roller.	400 ± 50 gr	Pressure roller lever spring	—

ELECTRICAL PARTS LOCATION



SCHEMATIC DIAGRAM MODEL RQ-421S

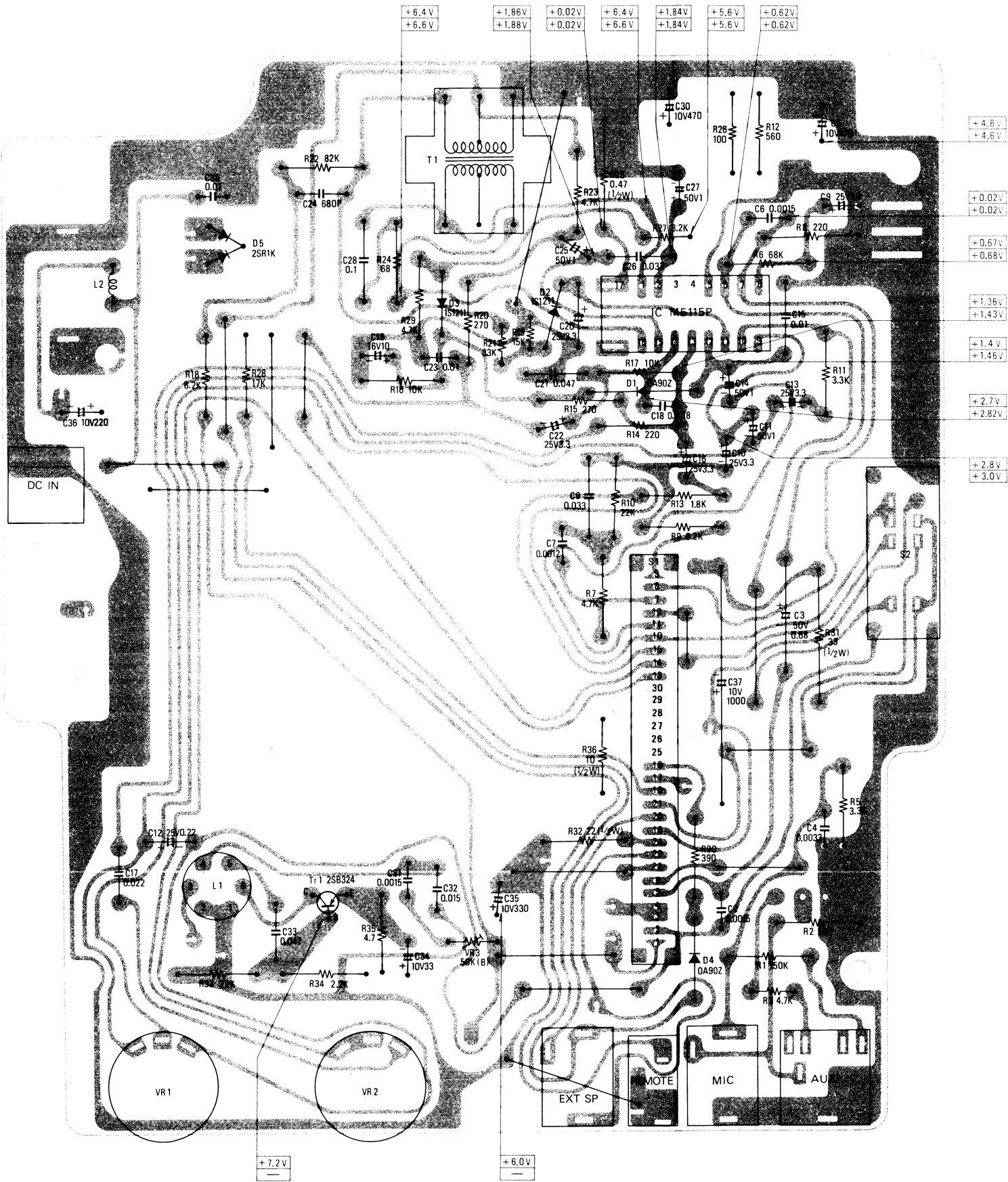


STANDARD VOLTAGE CHART					
Check Point	Recording	Playback	Check Point	Recording	Playback
①	+6.4 V	+6.6 V	⑨	+1.4 V	+1.46 V
②	+1.84 V	+1.84 V	⑩	+1.36 V	+1.43 V
③	+5.6 V	+5.6 V	⑪	+2.7 V	+2.82 V
④	+4.6 V	+4.6 V	⑫	+1.86 V	+1.88 V
⑤	+0.62 V	+0.62 V	⑬	+6.4 V	+6.6 V
⑥	+0.02 V	+0.02 V	⑭	+0.02 V	+0.02 V
⑦	+0.67 V	+0.68 V	⑮	+6.0 V	—
⑧	+2.8 V	+3.0 V	⑯	+7.2 V	—

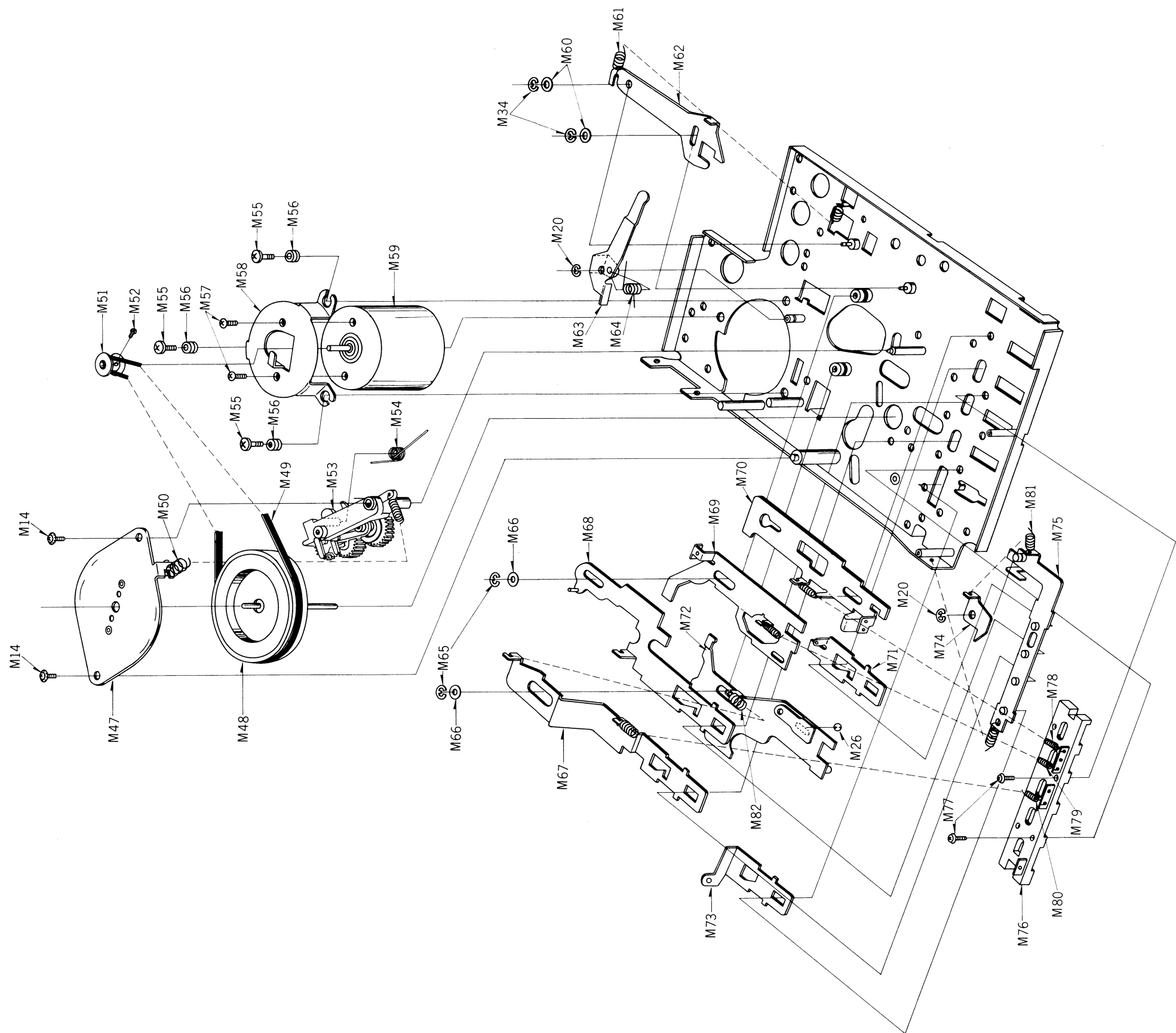
NOTE: All measurements are under no signal conditions with volume at minimum position.
Use VTVM for voltage measurements.

- NOTE:
- 1. S1-1~S1-10 ... Record/playback select switch (shown in playback position).
 - 2. S2-1, S2-2 Monitor switch.
1...SOUND MONITOR, 2...MANUAL, 3...EASYMATIC
 - 3. S3 Motor ON/OFF switch.
 - 4. S4 AC/DC select switch.
 - 5. S5 AC voltage select switch.
 - 6. VR1..... Volume control.
 - 7. VR2..... Tone control.
 - 8. VR3..... Recording bias current adjustment VR.
 - 9. Resistors are ohms (Ω), 1/4 watt unless specified otherwise.
K=1,000 Ω , M=1,000,000 Ω .
 - 10. Capacitors are microfarads (μ F) unless specified otherwise.
P=Pico-farads
 - 11. Encircled numbers (○) show the checkpoints for voltage.
The values are marked in the standard voltage chart.

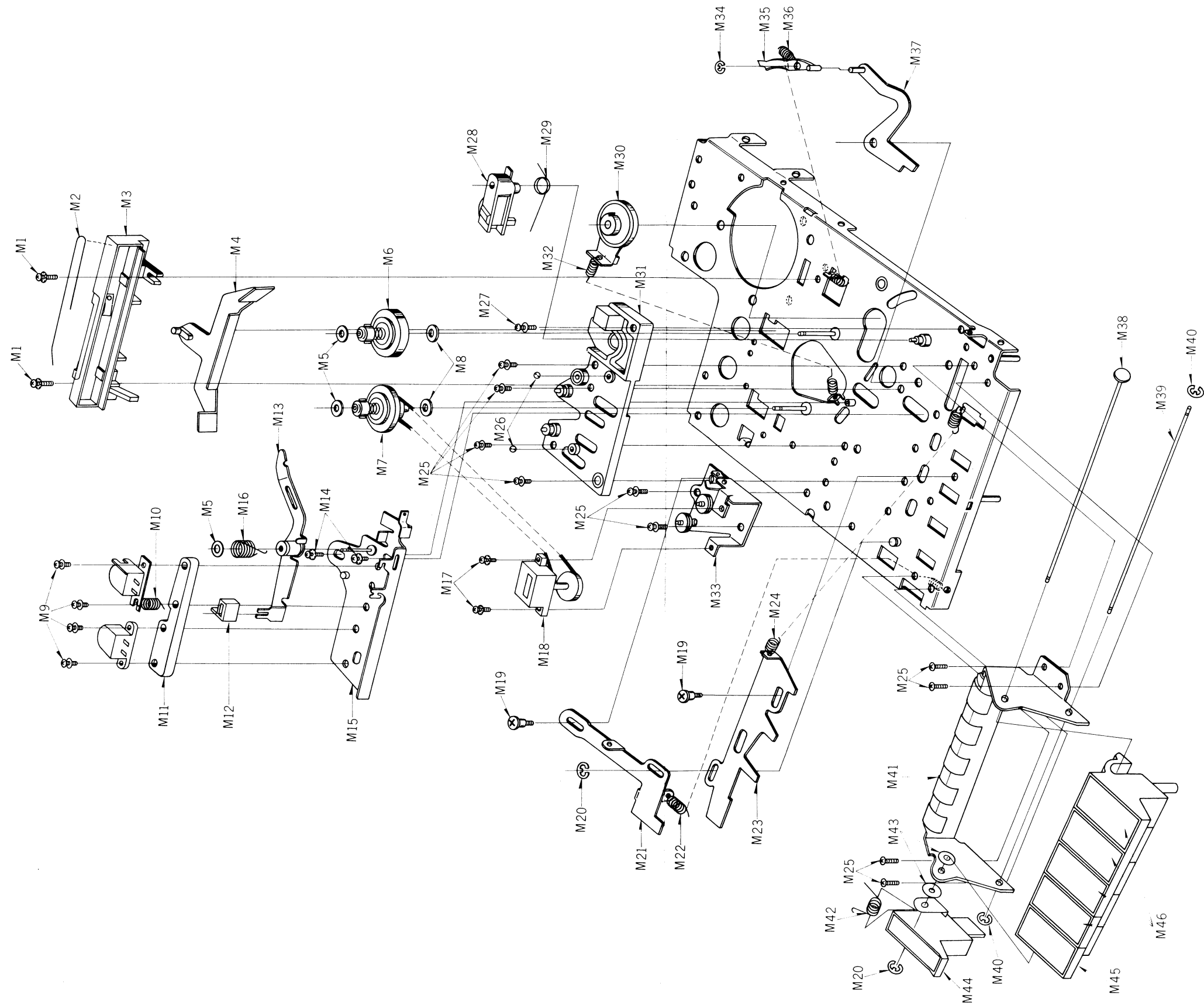
CIRCUIT BOARD



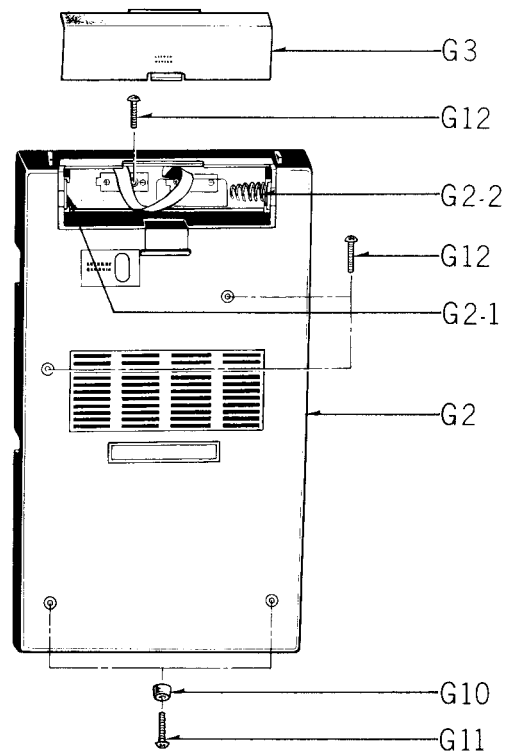
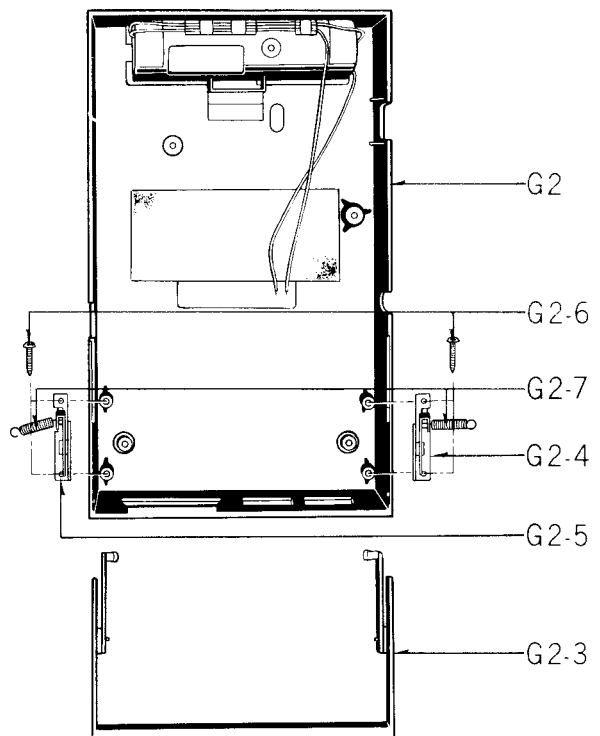
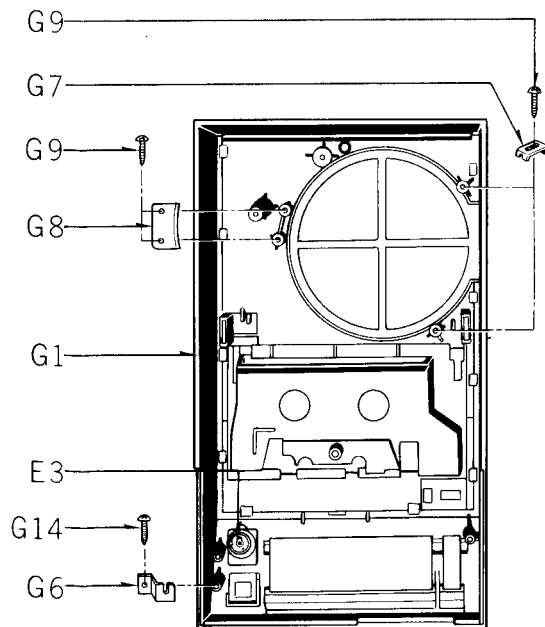
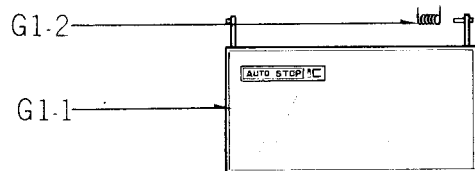
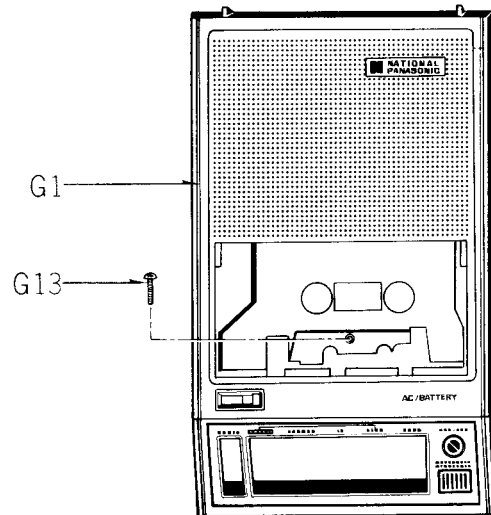
NOTE:
 The circuit shown in green on the conductor is + B circuit.
 Values indicated in are DC voltages between the chassis and electrical parts.
 The upper values should be measured during recording and the lower values during playback.



EXPLODED VIEWS



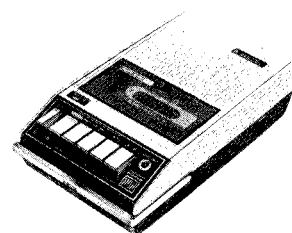
CABINET PARTS



REPLACEMENT PARTS LIST

MODEL RQ-421S

NATIONAL PANASONIC



RQ-421S

NOTE:

1. Be sure to make your orders of Replacement Parts according to this List.
2. "X" in "Rank" Column indicates that the part are not supplyable.
3. "A, B and C" in "Rank" Column indicates the recommended stock of replacement parts. Refer to the recommended stock table on last page.
4. "★" in "Remarks" Column indicates New Parts.
5. "ISO" in "Remarks" Column indicates ISO Screw or Nut.

NOTA:

1. Habrá que asegurarse que los pedidos de piezas de repuesto se hagan según esta lista.
2. "X" marcado en la columna "Rank", quiere decir que dichas piezas no pueden ser provistas.
3. "A, B y C" marcadas en la columna "Rank" indican el surtido que se recomienda tener de dichas piezas de repuesto.
4. "★" marcado en la columna "Remarks", quiere decir que las piezas son nuevas.
5. "ISO" marcado en la columna "Remarks", quiere decir que es un tornillo o tuerca "ISO".

NOTE:

1. Bien s'assurer de se conformer à la liste suivante pour les commandes de pièces de rechange.
2. "X", dans la colonne "Rank", indique qu'il n'est pas possible de fournir ces pièces.
3. "A, B et C", dans la colonne "Rank", indiquent le stock recommandé de pièces de rechange. Se reporter en dernière page au tableau des stocks/recommandés.
4. "★", dans la colonne "Remarks", indique les pièces nouvelles.
5. "ISO", dans la colonne "Remarks", indique une vis ou un écrou ISO.

HINWEIS:

1. Bestellen Sie Ihre Ersatzteile genau nach dieser Liste.
2. Mit "X" in der "Rank" Spalte aufgeführte Teile können nicht geliefert werden.
3. "A, B und C" in der "Rank" Spalte zeigt Ihnen den Vorrat der Ersatzteile an.
4. "★" in der "Remarks" Spalte bedeutet "neue Teile".
5. "ISO" in der "Remarks" Spalte bedeutet ISO-Schraube oder Mutter.

按:

1. 關於代用零件之訂購，務請依照此表而行之為荷。
2. 「等級」(Rank) 一欄中之 "X" 標記表示該零件無從供應。
3. 「等級」(Rank) 一欄中之 "A, B, C" 標記表示該零件有存貨，值得介紹。
請參照最後一頁的「值得介紹存貨表」。
4. 「備考」(Remarks) 一欄中之 "★" 形符號標記表示該零件為新品。
5. 「備考」(Remarks) 一欄中之 "ISO" 符號標記表示國際標準化機構 (ISO) 式螺絲或螺母。


Rank	Ref. No.	Description	Part No.	Pcs/ Set	Price (Per Pce.)		Remarks
		<u>MECHANICAL PARTS</u>					
C	M1	Sems Screw $\oplus M2.6 \times 8$	XYN26 + E8	2			COMMON
B	M2	Brake Spring	QBS1057	1			★
C	M3	Cassette Retainer Unit	QXQK0015	1			★
B	M4	Brake	QBJ1941	1			★
C	M5	Nylon Snap Washer	QWQ1124	3			RQ-227SE, 237S
A	M6	Tapeup Reel Table Assembly	QXP0319	1			RQ-227SE, 237S
A	M7	Supply Reel Table Assembly	QXP0320	1			”
C	M8	Oil Prevent Washer (1)	QBJ3220	2			”
C	M9	Screw $\oplus M2 \times 12$	XSN2 + 12	4			COMMON
B	M10	Head Spring	QBC1103	1			RQ-209S, 219S, 221S, 237S
C	M11	Head Spacer	QBJ2027	1			★
B	M12	Detecting Piece	QBJ1538	1			RQ-222S, 222AS, 237S
C	M13	Detecting Lever Assembly	QXL0482	1			RQ-227SE
C	M14	Sems Screw $\oplus M2.6 \times 6$	XYN26 + E6	4			COMMON
X	M15	Head Base Assembly	QXK0054	1			★
C	M16	Auto Stop Detecting Lever Spring	QBN1188	1			RQ-227SE
C	M17	Sems Screw $\oplus 2 \times 5$	XYN2 + E5	2			COMMON
A	M18	Tape Counter	QDC0044	1			RQ-237S, 238FHS
C	M19	Screw	QHQ1168	2			★
C	M20	Stop Ring $E3\phi$	XUC3FK	4			COMMON
C	M21	Eject Lever-C Assembly	QXL0618	1			★
C	M22	Eject Lever-C Spring	QBT1604M	1			★
C	M23	Eject Lever-D Assembly	QXL0619	1			★
C	M24	Eject Lever Spring	QBT1490	1			RQ-237S, 238FHS
C	M25	Sems Screw $\oplus 2.6 \times 6$	XYN26 + C6	10			COMMON
B	M26	Steel Ball 2.5ϕ	QDK1012	3			RQ-227SE, 237S
C	M27	Sems Screw $\oplus M2.6 \times 10$	XYN26 + C10	1			COMMON
A	M28	Pressure Roller Assembly	QXL0450	1			RQ-227ES, 237S

Rank	Ref. No.	Description	Part No.	Pcs/ Set	Price (Per Pce.)		Remarks
C	M29	Pressure Roller Spring	QBN1157	1			RQ-227SE, 237S
B	M30	Idler Lever Assembly	QXL0441	1			”
X	M31	Upper Base Assembly	QXK1331	1			★
B	M32	Idler Lever Spring	QBT1558M	1			RQ-227SE, 237S, RS-267S
X	M33	Counter Angle Assembly	QXE0171	1			★
C	M34	Stop Ring E2.5φ	XUC25FK	3			COMMON
C	M35	Auto Stop Driving Pawl	QBJ1656	1			RQ-227SE, 237S
C	M36	Auto Stop Spring	QBTk0014	1			★
C	M37	Auto Stop Driving Lever Unit	QXL0622	1			★
C	M38	Push Button Shaft-A	QMS2205	1			★
C	M39	Push Button Shaft-B	QMS2206	1			★
C	M40	Stop Ring E2φ	XUC2FK	2			COMMON
X	M41	Push Button Frame Assembly	QXE0169	1			★
C	M42	Push Button-B Spring	QBN1263	1			★
C	M43	Poly Washer 5.2×8×0.5	QBJ3283	1			★
A	M44	Push Button (3) Assembly	QXB0135	1			★
A	M45	Push Button (2) Assembly	QXB0134	1			★
A	M46	Push Button (1) Assembly	QXB0133	4			★
X	M47	Flywheel Retainer Unit	QXH0095	1			RQ-227SE, 237S
A	M48	Flywheel Assembly	QXF0063	1			”
A	M49	Flywheel Belt	QDB0141	1			”
C	M50	Fast Forward Lever (2) Spring	QBT1485M	1			”
B	M51	Motor Pulley	QDP1378	1			RQ-227SE, 237S
C	M52	Screw ⊕M2×3	XSN2+3	1			COMMON
C	M53	Fast Forward Frame Assembly	QXL0451	1			RQ-227SE, 237S
B	M54	Gear Lever Spring	QBN1196	1			”
C	M55	Screw	QMS1833	3			”
C	M56	Motor Rubber	QBG1055A	3			RQ-227SE, 237S
C	M57	Screw ⊕2.6×3	XSN26+3	2			COMMON

Rank	Ref. No.	Description	Part No.	Pcs/ Set	Price (Per Pce.)		Remarks
X	M58	Motor Angle	QMA1779	1			
A	M59	Motor	QDM0645	1			RQ-227SE
C	M60	Fiber Washer 3.2×9×0.5	QBK7124	2			COMMON
B	M61	Idler Spring	QBTk0013	1			★
C	M62	Lock Plate-B	QML2341	1			★
C	M63	Rewind Lever-B	QML2337	1			★
C	M64	Rewind Lever Spring	QBN1262	1			★
C	M65	Stop Ring E5φ	XUC5FK	2			COMMON
C	M66	Fiber Washer 6.2×11×1.0	QBK7130	2			RQ-227SE, 237S
C	M67	Playback Lever A	QML2331	1			★
C	M68	Fast Forward Lever A Assembly	QXL0616	1			★
C	M69	Fast Forward Lever B Assembly	QXL0624	1			★
C	M70	Record Lever Assembly	QXL0620	1			★
C	M71	Rewind Lever-A	QML2336	1			★
C	M72	Playback Lever-B Assembly	QXL0617	1			★
C	M73	Stop Lever	QML2335	1			★
C	M74	Lock Supporter	QML2342	1			★
X	M75	Lock Plate-A Unit	QXH0141	1			★
C	M76	Lever Guide Assembly	QXL0623	1			★
C	M77	Sems Screw $\oplus 2.6 \times 8$	XYN26+C8	2			COMMON
C	M78	Record Lever Spring-B	QBT1617M	1			★
C	M79	Record Lever Spring	QBT1486M	1			RQ-227SE, 237S
C	M80	Playback Lever Spring	QBT1536M	1			”
C	M81	Lock Supporter Spring	QBT1605	1			★
C	M82	Playback Lever-B Spring	QBT1603M	1			★
		<u>RESISTORS</u>					
B	R1	Carbon Resistor 150 K Ω 1/4 W	ERD14TJ154	1			
B	R2, 12	” 560 Ω 1/4 W	ERD14TJ561	2			
B	R3	” 4.7 K Ω 1/4 W	ERD14VJ472	1			


Rank	Ref. No.	Description	Part No.	Pcs/ Set	Price (Per Pce.)		Remarks
B	R5, 11	Carbon Resistor 3.3 K Ω 1/4 W	ERD14TJ332	2			
B	R6	" 68 K Ω 1/4 W	ERD14TJ683	1			
B	R7, 23, 29	Carbon Resistor 4.7 K Ω 1/4 W	ERD14TJ472	3			
B	R8, 14	" 220 Ω 1/4 W	ERD14TJ221	2			
B	R9, 18	" 8.2 K Ω 1/4 W	ERD14TJ822	2			
B	R10, 33	" 22 K Ω 1/4 W	ERD14TJ223	2			
B	R13	" 1.8 K Ω 1/4 W	ERD14TJ182	1			
B	R15, 20	Carbon Resistor 270 Ω 1/4 W	ERD14TJ271	2			
B	R16, 17	" 10 K Ω 1/4 W	ERD14TJ103	2			
B	R19	" 15 K Ω 1/4 W	ERD14VJ153	1			
B	R21	" 33 K Ω 1/4 W	ERD14VJ333	1			
B	R22	" 82 K Ω 1/4 W	ERD14TJ823	1			
B	R24	Carbon Resistor 68 Ω 1/4 W	ERD14TJ680	1			
B	R25	Wire-wound Resistor 0.47 Ω 1/2 W	ERM12PKR47	1			
B	R26	Carbon Resistor 100 Ω 1/4 W	ERD14TJ101	1			
B	R27	" 8.2 K Ω 1/4 W	ERD14VJ822	1			
B	R28	" 17 K Ω 1/4 W	ERD14TJ173	1			
B	R30	Carbon Resistor 390 Ω 1/4 W	ERD14TJ391	1			
B	R31	Solid Resistor 33 Ω 1/2 W	ERC12GK330	1			
B	R32	" 22 Ω 1/2 W	ERC12GK220	1			
B	R34	Carbon Resistor 2.2 K Ω 1/4 W	ERD14TJ222	1			
B	R35	" 4.7 Ω 1/4 W	ERD14TJ4R7	1			
B	R36	Solid Resistor 10 Ω 1/2 W	ERC14GK1000	1			
		<u>VARIABLE RESISTORS</u>					
A	VR1	Variable Resistor 5 K Ω (C)	EVJA2AT12C53	1			RQ-221S
A	VR2	" 20 K Ω (C)	EVJA2AT12C24	1			★
A	VR3	Semi-fixed Variable Resistor 50 K Ω (B)	EVLS3AA00B54	1			★

Rank	Ref. No.	Description	Part No.	Pcs/ Set	Price (Per Pce.)		Remarks
		<u>CAPACITORS</u>					
B	C1, 11, 14, 25, 27	Electrolytic Capacitor 1 μ F	ECEA50V1L	5			
C	C2, 6, 31	Mylar Capacitor 0.0015 μ F	ECQM05152MZ	3			
B	C3	Electrolytic Capacitor 0.68 μ F	ECEA50VR68H	1			
C	C4	Mylar Capacitor 0.0033 μ F	ECQM05332MZ	1			
B	C5, 30	Electrolytic Capacitor 470 μ F	ECEA10V470L	2			
C	C7	Mylar Capacitor 0.0012 μ F	ECQM05122MZ	1			
C	C8, 26	" 0.033 μ F	ECQM05333MZ	2			
B	C9, 10, 13, 16, 20, 22	Electrolytic Capacitor 3.3 μ F	ECEA25V3R3L	6			
B	C12	" 0.22 μ F	ECEA25VR22M	1			
C	C15, 23, 28	Mylar Capacitor 0.01 μ F	ECQM05103MZ	3			
C	C17	Mylar Capacitor 0.022 μ F	ECQM05223MZ	1			
C	C18	" 0.0018 μ F	ECQM05182MZ	1			
B	C19	Electrolytic Capacitor 10 μ F	ECEA16V10L	1			
C	C21, 33	Mylar Capacitor 0.047 μ F	ECQM05473MZ	2			
C	C24	Styrol Capacitor 680 pF	ECQS1681KZ	1			
C	C28	Mylar Capacitor 0.1 μ F	ECQM05104MZ	1			
C	C32	" 0.015 μ F	ECQM05153KZ	1			
B	C34, 39	Electrolytic Capacitor 33 μ F	ECEA10V33L	2			
B	C35	" 330 μ F	ECEA10V330L	1			
B	C36	" 220 μ F	ECEA10V220L	1			
B	C37	Electrolytic Capacitor 1000 μ F	ECEA10V1000L	1			
		<u>TRANSISTOR</u>					
A	Tr1	Transistor	2SB324	1			COMMON
		<u>DIODES</u>					
A	D1, 4	Diode	OA90Z	2			COMMON
A	D2, 3	Silicon Diode	1S1211	2			R: 221S, 235S, R: 253S, 267S
A	D5	"	2SR1K	1			★

Rank	Ref. No.	Description	Part No.	Pcs/ Set	Price (Per Pce.)		Remarks
		<u>INTEGRATED PART</u>					
B	IC	Integrated Circuit	M5115P	1			RS-253S, 267S
		<u>TRANSFORMERS</u>					
A	T1	Output Transformer	QLA0368	1			RQ-227SE
A	T2	Power Transformer	QLP0669	1			★
		<u>COILS</u>					
A	L1	Oscillator Coil	QLB0155	1			★
B	L2	Choke Coil	QLP0105	1			COMMON
		<u>SWITCHES</u>					
A	S1	Slide Switch (Record/playback selector)	QSS1142	1			RQ-238FHS
A	S2	Slide Switch (Monitor)	QSS1129	1			RQ-227SE, 237S
A	S3	Leaf Switch (Motor)	QSB0169B	1			RQ-209DS, RS-262US, 803US
B	S4	AC/DC select switch with AC socket	Ref. E4	(1)			
A	S5	Rotary Switch (AC voltage selector)	QSR0005B	1			RQ-221S, 226S, 225S, 238FHS
		<u>ELECTRICAL PARTS</u>					
A	E1	Record/playback Head	QWY0107Z	1			RQ-222S, 222AS, 227SE
A	E2	Erase Head	WY235X	1			RQ-227SE, RS-270JS
A	E3	Lever Meter	QSL0065	1			RQ-212S, 221S
B	E4	AC Socket with S4	QJS0316S	1			RQ-238FHS 
A	E5	Condenser Microphone	WM089DZ	1			★
B	E6	DC IN Jack	QJA0128	1			RQ-227SE, 237S
B	E7	M3 Jack	QJA0125	2			”
B	E8	M3 Jack with Switch	QJA0127	1			”
B	E9	M2 Jack	QJA0126	1			”
C	E10	Heat Sink	QTH1028	1			COMMON
C	E11	Jack Board	QGJ1216	1			★
A	E12	Volume Knob	QGT1121	2			RQ-209S, 221S, 412, 417S
A	E13	Speaker	EAS10P87S	1			★

Rank	Ref. No.	Description	Part No.	Pcs/ Set	Price (Per Pce.)		Remarks
		<u>CABINET PARTS</u>					
B	G1	Body Case Assembly (without Speaker)	QYB0320	1			★
A	G1-1	Cassette Lid	QKF1425	1			★
B	G1-2	Cassette Lid Spring	QBN7072	1			★
B	G2	Bottom Case Assembly	QYC0144	1			★
C	G2-1	Battery Terminal ⊕	QJB0047	2			RQ-209S, 209DS, 221S, 412S
C	G2-2	Battery Spring ⊖	QJB0004	2			RQ-209S, 209DS, 221S, 412S
C	G2-3	Handle	QKH1072	1			★
C	G2-4	Lock Plate Angle Unit-R	QYQ0219	1			★
C	G2-5	Lock Plate Angle Unit-L	QYQ0220	1			★
C	G2-6	Tapping Screw ⊕PH3×8	XTN3+8	4			COMMON
C	G2-7	Handle Spring	QBT1621M	2			★
B	G3	Battery Cover Assembly	QYF0102	1			★
C	G4	Case Angle-A	QKT1656	1			★
C	G5	Case Angle-B	QKT1657	1			★
C	G6	Microphone Holding Plate	QKT1636	1			★
C	G7	Speaker Holding Metal	QKT1172	2			RQ-238FHS, 238FJS
C	G8	Speaker Holding Metal-A	QKT1376	(1)			★
C	G9	Tapping Screw ⊕PH3×8	XTN3+8	4			COMMON
C	G10	Rubber Foot	QKA1067	2			★
C	G11	Screw ⊕2.6×14	XSN26+14FC	2			COMMON
C	G12	Screw ⊕2.6×6	XSN26+6FC	3			COMMON
C	G13	Screw ⊕2.6×11	XSN26+11FC	1			"
C	G14	Tapping Screw ⊕3×8	XTN3+8F	1			"
		<u>ACCESSORIES</u>					
A	A1	Cassette Tape (Demonstration)	QFT1TCCNRJZ	1			COMMON
A	A2	Earphone	EAS2SB1	1			"
A	A3	Radio Cord-R	RP8021 (QEB0017)	1			"
B	A4	AC Power Cord with Cap	QFC1065	1			RQ-238FHS

RQ-421S

Rank	Ref. No.	Description	Part No.	Pcs/ Set	Price (Per Pce.)		Remarks
A	A5	AC Plug Adaptor	QJP0603S	1			COMMON 
B	A6	Hand Case	QFK0074	1			★
B	A7	Instruction Book	QQT1715	1			★
		<u>PACKINGS</u>					
C	P1	Inside Carton	QPN2694	1			★
C	P2	Inner Cushion-A	QPN2695	1			★
C	P3	Inner Cushion-B	QPN2696	1			★
C	P4	Dust Cover	XZB26X36A05	1			RQ-209DS
C	P5	Accessory Box	QPW1125	1			RS-255US, 262US

RECOMMENDED STOCK OF REPLACEMENT PARTS

Rank of Part	Estimated Selling Q'ty of Tape Recorder Set					
	Less than 50	100	300	500	1,000	2,000
A rank Parts	2	5	15	20	40	80
B rank Parts	1	2	5	10	20	40
C rank Parts	0	1	3	5	10	20